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Claims

[c1] A valve for controlling fluid flow comprising:
a valve housing having at least one inlet port and a plurality of outlet ports; and
a valve rotor, rotatably disposed within the valve housing, wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect, in fluid relationship, the at least one inlet port with at least one outlet port of the plurality of outlet ports.

[c2] The valve for controlling fluid flow according to claim 1, wherein the valve rotor has a rotational axis extending therethrough and the at least one inlet port and the plurality of outlet ports of the valve housing are aligned along two axially spaced planes that are substantially perpendicular to the rotational axis.

[c3] The valve for controlling fluid flow according to claim 2, wherein the plurality of outlet ports includes an outlet port formed in the valve housing that is aligned so as to be parallel with the rotational axis of the valve rotor.

[c4] The valve for controlling fluid flow according to claim 1,

further comprising a biasing mechanism to position the valve rotor in a preselected rotational orientation relative to the valve housing.

[c5] The valve for controlling fluid flow according to claim 4, wherein the biasing mechanism includes a spring.

[c6] The valve for controlling fluid flow according to claim 1, further comprising a drive mechanism that is operatively connected to the valve rotor for moving the valve rotor to selected rotational orientations within the valve housing.

[c7] The valve for controlling fluid flow according to claim 6, wherein the drive mechanism includes a motor.

[c8] The valve for controlling fluid flow according to claim 7, wherein the motor includes a stepper motor.

[c9] The valve for controlling fluid flow according to claim 7, wherein the drive mechanism includes a motor operatively connected to a reduction gear combination.

[c10] The valve for controlling fluid flow according to claim 1, wherein the plurality of internal fluid passages includes at least one internal fluid passage that extends down along a rotational axis of the valve rotor and includes a first opening in a top portion of the valve rotor and a

second opening in a bottom portion of the valve rotor.

[c11] The valve for controlling fluid flow according to claim 1, wherein the valve rotor includes a rotational axis and the plurality of internal fluid passages includes at least one first internal fluid passage that extends down along the rotational axis of the valve rotor and wherein the plurality of internal fluid passages includes at least one second internal fluid passage that extends from the at least one first fluid passage to at least one opening in an outer surface of the valve rotor.

[c12] The valve for controlling fluid flow according to claim 1, wherein the plurality of internal fluid passages includes a first fluid passage that extends down along a rotational axis of the valve rotor and the plurality of internal fluid passages includes a second fluid passage that extends from the first fluid passage to a first opening in an outer surface of the valve rotor and the plurality of internal fluid passages includes a third fluid passage that extends from the first fluid passage to a second opening in the outer surface of the valve rotor and the plurality of internal fluid passages includes a fourth fluid passage that extends from the first fluid passage to a third opening in the outer surface of the valve rotor.

[c13] The valve for controlling fluid flow according to claim 12,

wherein the second fluid passage is axially aligned with the third fluid passage and the fourth fluid passage is substantially perpendicular to the second fluid passage and the third fluid passage to form a t-shaped fluid passage.

[c14] The valve for controlling fluid flow according to claim 1, wherein the plurality of internal fluid passages includes a plurality of axially extending internal fluid passages located within the valve rotor.

[c15] The valve for controlling fluid flow according to claim 14, wherein the plurality of axially extending internal fluid passages includes a first fluid passage, having a first diameter, that extends down along a rotational axis of the valve rotor and having a first opening in a top portion of the valve rotor and a second opening in a bottom portion of the valve rotor, wherein the plurality of axially extending internal fluid passages includes at least one second fluid passage, having a second diameter, wherein the at least one second fluid passage is parallel to the first fluid passage and the second diameter is less than the first diameter.

[c16] The valve for controlling fluid flow according to claim 15, wherein the at least one second fluid passage only extends for a portion of a length of the valve rotor to a

third opening in the bottom portion of the valve rotor.

[c17] The valve for controlling fluid flow according to claim 16, wherein the at least one second internal fluid passage includes at least one groove formed in the bottom portion of the valve rotor in fluid relationship with the third opening in the bottom portion of the valve rotor.

[c18] The valve for controlling fluid flow according to claim 1, wherein the plurality of internal fluid passages includes a first fluid passage that extends down along a rotational axis of the valve rotor and the plurality of internal fluid passages includes a second pie-shaped fluid passage that extends from the first fluid passage to an opening in an outer surface of the valve rotor.

[c19] The valve for controlling fluid flow according to claim 1, wherein the valve rotor and the valve housing are spaced apart to form a gap between the valve rotor and the valve housing to permit fluid flow.

[c20] The valve for controlling fluid flow according to claim 19, further including at least one flexible seal between the valve rotor and the at least one inlet port and including at least one flexible seal between the valve rotor and at least one outlet port of the plurality of outlet ports to prevent fluid from flowing into the gap.

[c21] The valve for controlling fluid flow according to claim 20, wherein the flexible seal includes at least one flange portion adjacent to the valve rotor and a collar portion adjacent to and extending into the at least one inlet port or the at least one outlet port of the plurality of outlet ports.

[c22] A valve for controlling fluid flow comprising:
a valve housing having at least one inlet port and a plurality of outlet ports;
a valve rotor, rotatably disposed within the valve housing, wherein the valve rotor can provide a plurality of internal fluid passages within the valve rotor to selectively connect, in fluid relationship, the at least one inlet port with at least one outlet port of the plurality of outlet ports;
a biasing mechanism to position the valve rotor in a preselected rotational orientation relative to the valve housing; and
a drive mechanism operatively attached to the valve rotor, wherein the drive mechanism includes a motor.

[c23] The valve for controlling fluid flow according to claim 22, wherein the plurality of internal fluid passages includes a first fluid passage that extends down along a rotational axis of the valve rotor and the plurality of internal fluid

passages includes a second fluid passage that extends from the first fluid passage to a first opening in an outer surface of the valve rotor and the plurality of internal fluid passages includes a third fluid passage that extends from the first fluid passage to a second opening in the outer surface of the valve rotor and the plurality of internal fluid passages includes a fourth fluid passage that extends from the first fluid passage to a third opening in the outer surface of the valve rotor.

[c24] The valve for controlling fluid flow according to claim 22, wherein the valve rotor and the valve housing are spaced apart to form a gap and further includes at least one flexible seal between the valve rotor and the at least one inlet port and at least one flexible seal between the valve rotor and at least one outlet port of the plurality of outlet ports to prevent fluid from flowing into the gap.

[c25] A valve for controlling fluid flow comprising:
a valve housing having a bottom portion, at least one inlet port and a plurality of outlet ports, wherein the at least one inlet port and at least one outlet port of the plurality of outlet ports are substantially located in a first plane and at least one outlet port of the plurality of outlet ports is substantially located in a second plane and at least one outlet port of the plurality of outlet ports is located on the bottom portion of the valve housing,

wherein the first plane and the second plane are substantially perpendicular to a rotational axis for the valve rotor and the first plane and the second plane are axially spaced from each other;

a valve rotor, rotatably disposed within the valve housing, wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect, in fluid relationship, the at least one inlet port with at least one outlet port of the plurality of outlet ports; and

a biasing mechanism disposed about a shaft of the valve rotor to position the valve rotor in a preselected rotational orientation relative to the valve housing.

[c26] The valve for controlling fluid flow according to claim 25, wherein the plurality of internal fluid passages includes a first fluid passage that extends down along a rotational axis of the valve rotor and the plurality of internal fluid passages includes a second fluid passage from the first fluid passage to a first surface opening in the valve rotor in the first plane and the plurality of internal fluid passages includes a third fluid passage from the first fluid passage to a second surface opening in the valve rotor in the first plane and the plurality of internal fluid passages includes a fourth fluid passage from the first fluid passage to a third surface opening in the valve rotor in the

first plane and the plurality of internal fluid passages includes a fifth fluid passage from the first fluid passage to a fourth surface opening in the valve rotor in the second plane and the plurality of internal fluid passages includes at least one sixth fluid passage from the fifth fluid passage to the at least one fifth fluid opening in the bottom portion of the valve rotor.

[c27] The valve for controlling fluid flow according to claim 26, wherein the at least one sixth fluid passage includes dual fluid passages that extend from the fifth fluid passage to dual grooved openings in the bottom portion of the valve rotor.

[c28] The valve for controlling fluid flow according to claim 25, wherein the valve rotor and the valve housing are spaced apart to form a gap and further includes at least one flexible seal between the valve rotor and the at least one inlet port and at least one flexible seal between the valve rotor and at least one outlet port of the plurality of outlet ports to prevent fluid from flowing into the gap.

[c29] A valve control system for controlling fluid flow comprising:

a valve housing having at least one inlet port and a plurality of outlet ports;

a valve rotor, rotatably disposed within the valve hous-

ing, wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect, in fluid relationship, the at least one inlet port with at least one outlet port of the plurality of outlet ports;

a drive mechanism operatively connected to the valve rotor; and

a processor that is operatively connected to the drive mechanism to selectively rotate the valve rotor.

[c30] The valve control system for controlling fluid flow according to claim 29, wherein the processor is operatively connected to a plurality of sensors.

[c31] The valve control system for controlling fluid flow according to claim 30, wherein the plurality of sensors includes at least one temperature sensor.

[c32] The valve control system for controlling fluid flow according to claim 29, further comprising a fluid pump that connected in fluid relationship to the at least one inlet port.

[c33] The valve control system for controlling fluid flow according to claim 32, wherein the fluid pump is powered by electricity.

[c34] The valve control system for controlling fluid flow ac-

cording to claim 29, further comprising a radiator that is connected in fluid relationship to at least one outlet port of the plurality of outlet ports.

[c35] The valve control system for controlling fluid flow according to claim 29, further comprising a biasing mechanism to position the valve rotor in a preselected rotational orientation relative to the valve housing.

[c36] A valve control system for controlling fluid flow comprising:

a valve housing having at least one inlet port and a plurality of outlet ports, wherein the at least one inlet port and at least one outlet port of the plurality of outlet ports are substantially located in a first plane and at least one other outlet port of the plurality of outlet ports is substantially located in a second plane, wherein the first plane and the second plane are substantially perpendicular to a rotational axis for the valve rotor and the first plane and the second plane are axially spaced from each other;

a valve rotor, rotatably disposed within the valve housing, wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect, in fluid relationship, the at least one inlet port with at least one outlet port of the plurality of outlet ports;

a biasing mechanism disposed about a shaft of the valve rotor to position the valve rotor in a preselected rotational orientation relative to the valve housing;
a drive mechanism operatively connected to the valve rotor;
a processor that is operatively connected to the drive mechanism to selectively rotate the valve rotor;
at least one sensor that is operatively connected to the processor; and
a fluid pump that is connected, in fluid relationship, to the at least one inlet port.

[c37] The valve control system for controlling fluid flow according to claim 36, further comprising a radiator that is connected in fluid relationship to at least one outlet port of the plurality of outlet ports.

[c38] A valve control system for controlling fluid flow comprising:
a valve housing having a bottom portion, at least one inlet port and a plurality of outlet ports, wherein the at least one inlet port and at least one outlet port of the plurality of outlet ports are substantially located in a first plane and at least one outlet port of the plurality of outlet ports is substantially located in a second plane and at least one outlet port of the plurality of outlet ports is located on the bottom portion of the valve housing,

wherein the first plane and the second plane are substantially perpendicular to a rotational axis for the valve rotor and the first plane and the second plane are axially spaced from each other;

a valve rotor, rotatably disposed within the valve housing, wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect, in fluid relationship, the at least one inlet port with at least one outlet port of the plurality of outlet ports;

a biasing mechanism disposed about a shaft of the valve rotor to position the valve rotor in a preselected rotational orientation relative to the valve housing;

a drive mechanism operatively connected to the valve rotor;

a processor that is operatively connected to the drive mechanism to selectively rotate the valve rotor;

at least one sensor that is operatively connected to the processor; and

a fluid pump that is connected, in fluid relationship, to the at least one inlet port.

[c39] The valve control system for controlling fluid flow according to claim 38, wherein the plurality of internal fluid passages includes a first fluid passage that extends down along a rotational axis of the valve rotor and the

plurality of internal fluid passages includes a second fluid passage from the first fluid passage to a first surface opening in the valve rotor in the first plane and the plurality of internal fluid passages includes a third fluid passage from the first fluid passage to a second surface opening in the valve rotor in the first plane and the plurality of internal fluid passages includes a fourth fluid passage from the first fluid passage to a third surface opening in the valve rotor in the first plane and the plurality of internal fluid passages includes a fifth fluid passage from the first fluid passage to a fourth surface opening in the valve rotor in the second plane and the plurality of internal fluid passages includes at least one sixth fluid passage from the fifth fluid passage to the at least one fifth fluid opening in the bottom portion of the valve rotor.

[c40] A method for controlling fluid flow comprising:
receiving fluid in at least one inlet port for a valve housing; and
electively directing the received fluid from the at least one inlet port into a valve rotor that is rotatably disposed within the valve housing and then out through at least one outlet port of a plurality of outlet ports, wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect the at least

one inlet port with at least one outlet port of the plurality of outlet ports for the valve housing.

[c41] The method for controlling fluid flow according to claim 40, further comprising positioning the valve rotor in a preselected rotational orientation relative to the valve housing with a biasing mechanism.

[c42] The method for controlling fluid flow according to claim 40, further comprising positioning the valve rotor in a preselected rotational orientation relative to the valve housing with a spring.

[c43] The method for controlling fluid flow according to claim 40, further comprising moving the valve rotor to selected rotational orientations within the valve housing with a drive mechanism that is operatively connected to the valve rotor.

[c44] The method for controlling fluid flow according to claim 40, further comprising moving the valve rotor to selected rotational orientations within the valve housing with a motor that is operatively connected to the valve rotor.

[c45] The method for controlling fluid flow according to claim 40, wherein the selectively directing the received fluid from the at least one inlet port into the valve rotor utilizing the plurality of internal fluid passages includes uti-

lizing at least one internal fluid passage that extends down along a rotational axis of the valve rotor having a first opening in a top portion of the valve rotor and having a second opening in a bottom portion of the valve rotor.

[c46] The method for controlling fluid flow according to claim 40, wherein the selectively directing the received fluid from the at least one inlet port into the valve rotor utilizing the plurality of internal fluid passages that includes a first fluid passage that extends down along a rotational axis of the valve rotor and the plurality of internal fluid passages includes a second fluid passage that extends from the first fluid passage to a first opening in an outer surface of the valve rotor and the plurality of internal fluid passages includes a third fluid passage that extends from the first fluid passage to a second opening in the outer surface of the valve rotor and the plurality of internal fluid passages includes a fourth fluid passage that extends from the first fluid passage to a third opening in the outer surface of the valve rotor.

[c47] The method for controlling fluid flow according to claim 40, wherein the selectively directing the received fluid from the at least one inlet port into the valve rotor and then out through at least one outlet port of the plurality of outlet ports includes permitting fluid flow through a

gap between the valve rotor and the valve housing.

[c48] The method for controlling fluid flow according to claim 47, wherein the selectively directing the received fluid from the at least one inlet port into a valve rotor and then out through at least one outlet port of the plurality of outlet ports includes preventing fluid flow through the gap between the valve rotor and the valve housing with at least one flexible seal between the valve rotor and the at least one inlet port and at least one flexible seal between the valve rotor and at least one outlet port of the plurality of outlet ports.

[c49] A method for controlling fluid flow comprising:
receiving fluid in at least one inlet port for a valve housing;
selectively directing the received fluid from the at least one inlet port into the valve rotor that is rotatably disposed within the valve housing and then out through at least one outlet port of a plurality of outlet ports,
wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect the at least one inlet port with at least one outlet port of the plurality of outlet ports for the valve housing;
positioning the valve rotor in a preselected rotational orientation relative to the valve housing with a biasing mechanism; and

moving the valve rotor to selected rotational orientations within the valve housing with a drive mechanism that is operatively connected to the valve rotor.

[c50] The method for controlling fluid flow according to claim 49, wherein the selectively directing the received fluid from the at least one inlet port into the valve rotor utilizing the plurality of internal fluid passages that includes a first fluid passage that extends down along a rotational axis of the valve rotor and the plurality of internal fluid passages includes a second fluid passage that extends from the first fluid passage to a first opening in an outer surface of the valve rotor and the plurality of internal fluid passages includes a third fluid passage that extends from the first fluid passage to a second opening in the outer surface of the valve rotor and the plurality of internal fluid passages includes a fourth fluid passage that extends from the first fluid passage to a third opening in the outer surface of the valve rotor.

[c51] The method for controlling fluid flow according to claim 49, wherein the selectively directing the received fluid from the at least one inlet port into the valve rotor and then out through at least one outlet port of the plurality of outlet ports includes preventing fluid flow through a gap between the valve rotor and the valve housing with at least one flexible seal between the valve rotor and the

at least one inlet port and at least one flexible seal between the valve rotor and at least one outlet port of the plurality of outlet ports.

[c52] A method for controlling fluid flow comprising:
receiving fluid in at least one inlet port for a valve housing;
selectively directing the received fluid from the at least one inlet port into a valve rotor that is rotatably disposed within the valve housing and then out through at least one outlet port of a plurality of outlet ports, wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect the at least one inlet port with at least one outlet port of the plurality of outlet ports for the valve housing;
positioning the valve rotor in a preselected rotational orientation relative to the valve housing with a biasing mechanism; and
moving the valve rotor to selected rotational orientations within the valve housing with a drive mechanism that is operatively connected to the valve rotor, wherein the drive mechanism is controlled by a processor that is operatively attached thereto.

[c53] The method for controlling fluid flow according to claim 52, further includes receiving input from a plurality of sensors into the processor, which is operatively con-

nected to the plurality of sensors.

[c54] The method for controlling fluid flow according to claim 52, further includes receiving input from at least one temperature sensor into the processor, which is operatively connected to the at least one temperature sensor.

[c55] The method for controlling fluid flow according to claim 52, further includes providing fluid into the at least one input port from a fluid pump that is connected in fluid relationship thereto.

[c56] The method for controlling fluid flow according to claim 52, further includes receiving fluid from the at least one of the plurality of output ports into a radiator that is connected in fluid relationship thereto.

[c57] A method for controlling fluid flow comprising:
receiving fluid in the at least one inlet port for a valve housing;
selectively directing the received fluid from the at least one inlet port into a valve rotor that is rotatably disposed within the valve housing and then out through at least one outlet port of a plurality of outlet ports, wherein the valve rotor includes a plurality of internal fluid passages within the valve rotor to selectively connect the at least one inlet port with at least one outlet port of the plurality

of outlet ports for the valve housing;

positioning the valve rotor in a preselected rotational orientation relative to the valve housing with a biasing mechanism;

moving the valve rotor to selected rotational orientations within the valve housing with a drive mechanism that is operatively connected to the valve rotor, wherein the drive mechanism is controlled by a processor that is operatively attached thereto;

receiving input from the at least one sensor that is operatively connected to the processor;

providing fluid into the at least one input from a fluid pump that is connected in fluid relationship thereto; and

receiving fluid from at least one outlet port of the plurality of outlet ports into a radiator that is connected in fluid relationship thereto.